



COLLEGE: COLLEGE OF ENGINEERING, SCIENCE & TECHNOLOGY (CEST)

SCHOOL: SCHOOL OF ELECTRICAL & ELECTRONICS ENGINEERING

PROGRAMME: CERTIFICATE IV IN ELECTRICAL ENGINEERING-STAGE 1

UNIT CODE: EEE325

TITLE: CRAFT SCIENCE

FINAL EXAMINATION – PENSTER 2, 2017

**ROOM: AS PER TIMETABLE
TIME: 2 HOURS 10 MINUTES**

INSTRUCTIONS TO STUDENTS

1. You are allowed 10 minutes extra reading time during which you are NOT to write.
2. Begin each SECTION on a fresh page and use both sides of the sheet.
3. Write your candidate number at the top of each attached sheet.
4. Insert all written foolscaps, graph paper, drawing paper, etc. in their correct sequence and secure with a string.
5. For all sheets of paper on which rough/draft work has been done, cross it through and ATTACH these to your answer scripts.
6. Write clearly the number(s) of the question(s) attempted on the top of each sheet.
7. Use of programmable calculator(s) is prohibited.
8. **ANSWER ALL QUESTIONS**
9. Show all working where necessary.
10. **ALWAYS CHECK YOUR WORK BEFORE YOU LEAVE THE EXAM ROOM.**

SECTION A (20 MARKS)

In each of the following statements one of the suggested answers is correct. Write the identifying letters beside the question numbering in your answer sheet.

MULTIPLE CHOICE

1. One characteristic of metals is that it has:
 - a. tendency to gain or share electrons
 - b. gas
 - c. tendency to lose electrons
 - d. all of the above

2. The atoms in a _____ more readily move in relation to one another and vibrate at a speed dependent on temperature:
 - a. molecule
 - b. solids
 - c. liquids
 - d. gas

3. Materials such as sand rocks, gravels, metals clays and ceramics are known as:
 - a. Inorganic materials
 - b. Organic materials
 - c. ceramics
 - d. insulator

4. In the structure of the atom the negatively charged particle is the:
 - a. electrons
 - b. protons
 - c. neutrons
 - d. nucleus

5. When substances are intermingled without being chemically combined they form:
 - a. elements
 - b. chemical
 - c. matter
 - d. mixtures

6. Most organic compounds do not dissolve in:
 - a. water
 - b. mixtures
 - c. solutions
 - d. alcohol

7. In dead mild steel the carbon content is deliberately kept as low as possible so that the steel will have:
- high ductility
 - high strength
 - more resistance
 - greater capacity.
8. Brass alloys are alloys of:
- copper and tin
 - copper and zinc
 - tin and zinc
 - all of the above
9. The property of any material by which it opposes the flow of electric current is known as:
- voltage
 - capacitance
 - inductance
 - resistance
10. Any good conductor would have large numbers of:
- conduction
 - resistivity
 - protons
 - free electrons
11. The rate of change in velocity is known as:
- speed
 - acceleration
 - density
 - pressure
12. The ability of a material to suffer indentation or penetration without fracture is known as:
- brittleness
 - ductility
 - softness
 - hardness
13. _____ contains very few or no free electrons.
- conductors
 - insulators
 - semi-conductors
 - All of the above

14. The best conductors of heat are:
- liquids
 - gases
 - plastics
 - metals
15. _____ is the term used to denote the effect of a force producing or tending to produce rotation of a body about a point.
- friction
 - torque
 - tenacity
 - work
16. The area under the velocity –time graph gives:
- acceleration
 - average speed
 - time spent
 - distance covered
17. The ratio of the power output to the power input as a percentage is:
- machine loss
 - power input
 - power output
 - efficiency
18. The rate of change of velocity is known as:
- gravity
 - velocity
 - acceleration
 - motion
19. The density of a liquid is defined as its:
- distance per time
 - volume per weight
 - mass per unit area
 - Mass per unit volume.
20. Pressure within a body of liquid depends upon two factors:
- distance and depth
 - density and depth
 - voltage and current
 - type of material and density

SECTION B

True & false

(10 MARKS)

Write down the question numbers in your answer booklet and beside it write the answers in either **true or false**

1. A Neutrally charged atom has more electrons
2. A combination of two or more elements is called a compound
3. An insulator contains very few or no free electrons
4. A tension tends to compress an object
5. The mass of a unit volume of a material is called its density
6. The flow of electrons in a conductor is the flow of current
7. We cannot see a force but we can only see its effect on the object upon which it acts.
8. A single force that will just cancel the effects of several forces is called the equilibrant
9. Thermal energy is energy that results from moving atoms or molecules and is commonly referred to as heat
10. Electrical energy is a form of energy that occurs as a result of either stored or moving charged particles.

SECTION C**(30 MARKS)**

1. Define the following:
 - power
 - current
 - voltage(3 Marks)
2. Name three states of matter and briefly explain each (3 marks)
3. Outline four factors that affect the resistance of a conductor AND also explain relationship with reference to resistance. (4 Marks)
4. List two characteristics of ionic compound AND three characteristics of covalent compound. (4 Marks)
5. Name FOUR (4) insulators and their specific applications in the electrical industry. (6 Marks)
6. Show with the aid of diagram when the force is in equilibrium (3 marks)
7. What are the three (3) factors which governs the rate of corrosion? (3 Marks)
8. List down the four (4) Mechanical properties of materials. (4 Marks)

SECTION D **(40 MARKS)**

1. Calculate the uniform acceleration of a sports car which:
 - a) Starts from rest and reaches a speed of 15 m/s in 10 s
 - b) Changes its speed from 20m/s to 32 m/s in 4 s
 - c) Starts from rest and goes a distance of 98m in 7 s
 - d) Starts from rest and travels a distance of 22m during sixth second of motion.(8 marks)
2. The field windings of a generator has a resistance of 145 Ω at a temperature of 20⁰ C. What will be the resistance of the windings when the machine temperature rises on full load to 80⁰ C? ($\alpha_0 = 0.00427$) (4 Marks)
3. A solid block 300mm x 250mm x 200mm is immersed in water; calculate the buoyant force acting on the block. (Density of water 1000kg/m³) (3 Marks)
4. Find the work energy and power input when 245N is applied to the crank handle with radius of 400mm when it is rotated 10 times in 40 seconds. (5 marks)

5. A stone is thrown vertically upwards with a velocity of 3m/s .Find:
- a) The maximum height reached.
 - b) Time taken to reach the maximum height
 - c) Total time of the flight
 - d) Time taken to reach 10m above the ground on its way down
 - e) What will be the velocity of the stone as it strikes on its way down?
- (10 Marks)
6. If a mass of 100kg is lifted 2m in 20 sec ,find power output. (4marks)
7. A certain marble landmark has a mass of 2.8 tonnes (2800 kg) cools down from 50^o C to 30^o C and in doing so gives out 1.5 mega joules of heat. What is the specific heat of this marble?
- (4 marks)
8. How many units of heat energy are created by a 50Ω resistor connected to a 240V supply if the supply is left switched on for 3 minutes?
- (2 marks)

The End